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Functional outcomes after transurethral resection of the prostate (TURP) in nursing home residents

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Abstract

Background/Objectives—Bladder outlet obstruction, a common problem in older men, is often treated by transurethral resection or laser incision of the prostate (TURP/TULIP). The goal of surgery is to improve urination; however, outcomes of surgery in men with high levels of functional dependence are poorly understood.

Design—Retrospective cohort study.

Setting—Nursing homes in the United States.

Participants—Two thousand eight hundred and sixty-nine male nursing home residents age 65 and older who underwent TURP/TULIP in the United States between 2005 and 2008.

Measurements—We examined changes in activities of daily living (ADL), foley status and survival up to 12 months after surgery. Multivariate regression was used to determine risk of having a foley 1 year after surgery.

Results—Over half (61%) of the cohort had a foley before the procedure. Among men with a foley at baseline, 64% had a foley, 4% had no foley, and 32% had died 1-year post procedure. The presence of a foley at baseline (RR 1.39; 95% CI 1.29-1.50) and poor baseline functional status (RR 1.34; 95% CI 1.18-1.52 for individuals with the worst quartile of function) were associated with increased risk of a foley at 1-year.

Conclusion—Poor baseline functional status and the presence of a foley preoperatively were associated with an increased risk of TURP/TULIP failure, as measured by the presence of a foley

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Suskind: concept and design, interpretation of data, preparation of manuscript

Walter and Finlayson: concept and design, interpretation of data

Zhao: data analysis and interpretation

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at 1 year. Preoperative measurement of ADLs may aid in surgical decision-making in this population.

Keywords

geriatric; frail; urology; Medicare; foley

Introduction

Lower urinary tract symptoms (LUTS) and benign prostatic hypertrophy (BPH) are exceedingly common in the older population, affecting up to one-third of men in their 60's and half of men in their 80's.[1] Transurethral resection of the prostate (TURP) and transurethral laser incision of the prostate (TULIP) are elective procedures performed on such individuals with the intent of improving urination, obviating the need for a foley, and functional independence.[2]

Despite demonstration that TURP/TULIP are safe and effective in healthy older patients,[3,4] outcomes of these procedures among frail older individuals remain unknown. Our previous work demonstrated that frail older men undergoing TURP procedures have higher rates of complications compared to their non-frail counterparts,[5] a finding that is echoed in outcomes of frail older patients undergoing other urologic and non-urologic procedures throughout the surgical literature.[6-10] Furthermore, whether or not the growing number of older patients with LUTS and BPH who are functionally dependent, or frail, benefit at all from elective TURP/TULIP is poorly understood.

Using data from national Medicare inpatient claims linked to the Minimum Data Set (MDS) for Nursing Homes, we examined important outcomes of TURP and TULIP procedures among male nursing home residents from 2005 to 2008 in the United States. More specifically, we looked at the presence of a foley, functional status and survival up to 1 year after surgery. Findings from this study will help elucidate whether or not this elective procedure aimed at improving functionality is indeed effective in this growing frail older population.

Methods

Patients and Databases

We linked data from the Medicare Inpatient File with the MDS to identify male nursing home residents who underwent TURP and TULIP procedures between 2005 and 2008. The Medicare Inpatient File contains information for all fee-for-service inpatient hospital encounters for Medicare beneficiaries. The MDS is a mandatory assessment of all nursing home residents who reside in Medicare and Medicaid programs. These assessments are performed at admission, readmission, quarterly and when a resident experiences a change in clinical status. This study was approved by the University of California, San Francisco's (UCSF) Human Research Program.

We identified male nursing home residents undergoing the procedures of interest using ICD9 codes in the Medicare Inpatient File: 60.29 for other transurethral prostatectomy [includes

excision of median bar by transurethral approach, transurethral electrovaporization of prostate (TEVAP), transurethral enucleative procedure, transurethral prostatectomy NOS, and transurethral resection of the prostate (TURP)] and 60.21 for transurethral (ultrasound) guided laser induced prostatectomy (TULIP). We classified nursing home residents as long-term and included them in our study if they completed 2 or more consecutive full or quarterly assessments performed over 90 days apart during the 6 months prior to their procedure and had a nursing home length of stay of at least 90 days after the procedure.

Outcomes

The primary outcomes of this study were functional status, foley status, and survival and each outcome was assessed at baseline (the time of the surgery), 3, 6, 9, and 12 months after surgery. Death was determined using information from the Medicare Denominator File. Foley status was ascertained from the MDS.

Functional status was measured in the MDS by using the MDS Activities of Daily Living Score (MDS-ADL score).[11] This validated measure of function is calculated by summing scores (ranging from independent [0] to total dependence [4]) on 7 items/domains of function: dressing, personal hygiene, toilet use, transfer, locomotion, bed mobility, and eating. The score can range from 0 to 28, with 0 representing total independence on all 7 ADLs and 28 representing total dependence on all of the 7 ADLs. Residents were classified as having a decline in functional status if they experienced at least a 2 point increase in their MDS-ADL score, as previously used in the literature.[12,13] Likewise, residents were classified as having an improvement in functional status if they experienced at least a 2 point decrease in their MDS-ADL score.

Covariates

Demographic data on age, race and information on the number of hospitalizations in the year prior to surgery were collected from the Medicare Inpatient Files. Comorbidities were obtained from both the Medicare Inpatient File and the MDS and were used to calculate the Charlson score.[14] Functional decline before surgery was measured by a 2-point or greater increase in the MDS-ADL in the 6 months prior to surgery. We used the MDS to calculate the MDS Cognitive performance scale score (MDS-CPS) using established methods.[15] The MDS-CPS is scored from 0 (no impairment) to 6 (severe impairment) on 5 cognition-focused domains: comatose status, decision-making, short-term memory, making self understood, and eating. A CPS score of 3 indicates moderate cognitive impairment and a score of greater than or equal to 3 has been used to define dementia in the literature.[16] The MDS-CPS has been validated and corresponds closely with the Mini-Mental State Exam (MMSE).[17,18]

Statistical Analysis

Descriptive variables were compared using Chi square analysis for dichotomous categorical variables and analysis of variance for categorical and continuous variables. Multivariate logistic regression models predicting the presence of a foley at 1-year post procedure were adjusted for the following variables: presence of a foley at baseline, age, race, decline of functional status (MDS-ADL) in the 6 months prior to baseline, baseline MDS-ADL score

quartile, cognitive status (MDS-CPS score), number of hospitalizations in the year prior to surgery, and Charlson score. We then used mixed-effects spline models to incorporate the multiple measurements for individual subjects to allow us to assess functional trajectories before and after surgery. Specifically, these were restricted cubic spline models with knots at each of our time points. Models included fixed and random effects for the coefficients of the spline, where each subject's measurements were scattered around a subject-specific smooth curve. Fixed affects included whether or not the patient had a foley, allowing for the population trajectory to shift based on the baseline characteristics. For all analyses, P=0.05 on 2-sided significance test was considered statistically significant.

Results

Between 2005 and 2008, 2,869 long-term male nursing home residents underwent TURP/TULIP. The average age of these residents was 80.9 years and 80.5% were white (Table 1). Mean baseline MDS-ADL score was 13.8 (scale 0 to 28, higher scores represent worse functional status) and 28.6% experienced functional decline in the 6 months prior to surgery. Almost half, 44.3%, of residents had an MDS-CPS score of >/= 3, classifying them as cognitively impaired or having dementia. The average number of hospitalizations in the year preceding surgery was 4 and 26.7% had a Charlson score of >/=3. Compared to residents without a foley, residents who had a foley preoperatively (41%) were more likely to be white (85.5% compared to 77.1%; p<0.0001), have more functional impairment at baseline (MDS-ADL score 15.8 compared to 12.4; p<0.0001), have functional decline prior to surgery (36.7% compared to 23.0%; p<0.0001), have more hospitalizations in the year prior to surgery (4.8 compared to 3.4; p<0.0001) and have a higher Charlson score (28.2% compared to 25.7% for Charlson score >/=3; p=0.005).

One year after surgery, 32% and 30% of residents who did and did not have a foley at baseline, respectively, were dead (Figure 1). Among residents who had a foley at baseline, 94% of 1-year survivors had a foley at 1 year follow up. Among residents who did not have a foley at baseline, 11% of 1-year survivors had a foley at 1-year follow-up.

Significant predictors of having a foley 1 year after surgery among survivors include having a foley at baseline (adjusted RR 1.39; 95% CI 1.29-1.50), baseline functional decline as measured by the MDS-ADL (adjusted RR 1.10; 95% CI 1.02-1.19), most impaired quartile of MDS-ADL function (adjusted RR 1.34; 95% CI 1.18-1.52), and higher number of hospitalizations in the year preceding surgery (adjusted RR 1.23; 95% CI 1.07-1.41) (Table 2). Of note, age, cognitive status, and Charlson score were not associated with having a foley at 1 year after surgery. In order to address the competing risk of death as an outcome, we ran an additional similar model with a composite outcome of having a foley or dying within 1 year after surgery. The only differences in this model compared to the original model was that there were additional statistically significant associations between ages >/=80 and impaired cognition measured as a MDS-CPS score of >/=3 and the presence of a foley or death within 1 year after surgery (data not shown).

Functional status, measured by MDS-ADL score at 3, 6, 9 and 12 months after TURP/TULIP is shown in figure 2. Over time, a higher percentage of residents had died, a lower

percentage of residents maintained their ADL status, while the percentage of residents who either improved or declined in their functional status stayed fairly equivalent, compared to their baseline function. Figure 3 shows that men with a foley at 1 year after surgery had consistently worse functional trajectories compared to men with no foley at 1 year ($p<0.0001$).

Discussion

In our study of 2,869 long-term male nursing home residents undergoing TURP/TULIP procedures, we found that the majority of residents gained little, if any, improvement in functional status and the overwhelming majority (94%) of patients who had a foley preoperatively continued to have a foley 1 year later. Poor baseline functional status, decline of function prior to surgery, higher number of hospitalizations in the year prior to surgery and the presence of a foley preoperatively were all associated with increased the risk of having a foley 1 year after surgery. Age, cognitive status, and comorbidity score were not significantly associated with increased risk of this outcome.

In general, surgical outcomes are poor and 12-month mortality is high among nursing home residents.[12,19-21] This raises important questions as to whether or not functionally impaired nursing home residents should undergo surgery, particularly if it is elective and if alternatives exist. Our study found that over 30% of individuals died by 12 months after surgery, and few, if any had improvement or even maintenance of their ADLs during this time period. These findings compare to those in nursing home residents undergoing other larger procedures such as lower extremity revascularization procedures (51% mortality and 32% functional decline at 1-year)[19]and colon cancer surgery (53% mortality and 24% functional decline at 1-year).[12]

This study demonstrates that poor preoperative functional status, both baseline MDS-ADL score and decline of MDS-ADL in the 6 months prior to surgery, are significant predictors of treatment failure, as measured by the presence of a foley at 1-year. This finding, while intuitive, is important and can be a helpful factor in preoperative counseling and decision-making among frail patients.

The presence of a foley preoperatively had a profound impact on whether or not patients had a foley 1-year postoperatively. Among male residents with a foley at baseline, 94% who were alive at 1-year still had a foley. Alternatively, most residents who did not have a foley at baseline and survived 1 year after surgery did not have a foley. Presence of a foley at baseline was also a significant predictor of having a foley at 1-year in our regression model, with an adjusted RR 1.39; 95% CI 1.29-1.50). Patients who had a foley at baseline tended to be less healthy than those without a foley at baseline, as they had a higher degree of functional dependence at baseline, a higher frequency of functional decline prior to surgery, more hospitalizations in the year prior to surgery and had a higher Charlson score at baseline. Taken together, these findings suggest that TURP/TULIP procedures among male nursing home residents with foley should be performed with low expectations of success or perhaps not at all.

While the reason behind our findings is outside the scope of this study, it is important to remember that normal voiding requires both an open bladder outlet (the prostate) and an adequate detrusor contraction (the bladder), but that TURP/TULIP procedures only address the outlet and not the bladder. Furthermore, patients with impaired bladder contractility who undergo TURP/TULIP would have an open bladder outlet but would still be unable to mount a detrusor contraction sufficient for voiding. Our study suggests that individuals with preoperative functional decline and foley use may represent patients with bladder impairment, making them poor candidates for bladder outlet procedures. Bladder function testing with urodynamics in such individuals would be helpful to further confirm the relationship between functional impairment and the presence of a foley with impaired detrusor function versus bladder outlet obstruction, versus a combination of the two.

To our knowledge, ours is the first study to evaluate TURP/TULIP among male nursing home residents or among men with functional dependence in the United States. Our findings raise important questions about the appropriateness of this procedure among functionally dependent populations and raises the broader question about whether relatively minor procedures performed to improve quality of life, such as TURP/TULIP, are successful in this population.

Our study should be considered with certain limitations in mind. First, we lacked detailed information about the residents' indications for surgery and the bother or severity of their condition. We were, however, able to use information on the presence of a foley as a measure of urinary status, which gives us a good indication of whether or not an individual is able to volitionally void. Second, were unable to identify residents who chose not to have surgery for their LUTS/BPH to compare their outcomes to men who underwent these procedures. Furthermore, there may be a positive selection bias among individuals who chose to have surgery. However, such a bias would only serve to underestimate the negative effect of surgery that was demonstrated in this study.

Treatment decisions among nursing home residents are often complex, necessitating balancing risk, benefit, and quality and longevity of life. These treatment decisions are even more difficult when the procedure under consideration is elective or aimed to improve the patient's quality of life by helping with urination or by improving functional status. Among male nursing home residents undergoing TURP/TULIP procedures, we found that functional dependence and the presence of a foley at baseline were strong predictors of TURP/TULIP failure and we argue that these procedures should not be performed in these subsets of nursing home residents. These findings are important to consider when making decisions about surgery in this vulnerable and growing population.

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References

1. McVary KT. BPH: epidemiology and comorbidities. The American journal of managed care. Apr; 2006 12(5 Suppl):S122–128. [PubMed: 16613526]
2. McVary KT, Roehrborn CG, Avins AL, et al. Update on AUA guideline on the management of benign prostatic hyperplasia. The Journal of urology. May; 2011 185(5):1793–1803. [PubMed: 21420124]
3. Elshal AM, Elmansy HM, Elhilali MM. Transurethral laser surgery for benign prostate hyperplasia in octogenarians: safety and outcomes. Urology. Mar; 2013 81(3):634–639. [PubMed: 23332997]
4. Losco G, Mark S, Jowitt S. Transurethral prostate resection for urinary retention: does age affect outcome? ANZ journal of surgery. Apr; 2013 83(4):243–245. [PubMed: 23186140]
5. Suskind AM, Walter LC, Jin C, et al. The impact of Frailty on complications in patients undergoing common urologic procedures; a study from the American College of Surgeons National Surgical Quality Improvement Database. BJU Int. May; 2016 117(5):836–42. doi: 10.1111/bju.13399. Epub 2016 Jan 17. PMID: 26691588. [PubMed: 26691588]
6. Makary MA, Segev DL, Pronovost PJ, et al. Frailty as a predictor of surgical outcomes in older patients. Journal of the American College of Surgeons. Jun; 2010 210(6):901–908. [PubMed: 20510798]
7. Green P, Arnold SV, Cohen DJ, et al. Relation of Frailty to Outcomes After Transcatheter Aortic Valve Replacement (from the PARTNER Trial). The American journal of cardiology. Apr 18.2015
8. Partridge JS, Fuller M, Harari D, Taylor PR, Martin FC, Dhesi JK. Frailty and poor functional status are common in arterial vascular surgical patients and affect postoperative outcomes. Int J Surg. Apr 20.2015 18:57–63. [PubMed: 25907322]
9. Ambler GK, Brooks DE, Al Zuhir N, et al. Effect of frailty on short- and mid-term outcomes in vascular surgical patients. The British journal of surgery. May; 2015 102(6):638–645. [PubMed: 25764503]
10. Revenig LM, Canter DJ, Kim S, et al. Report of a Simplified Frailty Score Predictive of Short-Term Postoperative Morbidity and Mortality. Journal of the American College of Surgeons. May; 2015 220(5):904–911. e901. [PubMed: 25907870]
11. Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. The journals of gerontology. Series A, Biological sciences and medical sciences. Nov; 1999 54(11):M546–553.
12. Finlayson E, Zhao S, Boscardin WJ, Fries BE, Landefeld CS, Dudley RA. Functional status after colon cancer surgery in elderly nursing home residents. Journal of the American Geriatrics Society. May; 2012 60(5):967–973. [PubMed: 22428583]
13. Kurella Tamura M, Covinsky KE, Chertow GM, Yaffe K, Landefeld CS, McCulloch CE. Functional status of elderly adults before and after initiation of dialysis. The New England journal of medicine. Oct 15; 2009 361(16):1539–1547. [PubMed: 19828531]
14. Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. Journal of clinical epidemiology. Jun; 1992 45(6):613–619. [PubMed: 1607900]
15. Morris JN, Fries BE, Mehr DR, et al. MDS Cognitive Performance Scale. Journal of gerontology. Jul; 1994 49(4):M174–182. [PubMed: 8014392]
16. Carpenter GI, Hastie CL, Morris JN, Fries BE, Ankri J. Measuring change in activities of daily living in nursing home residents with moderate to severe cognitive impairment. BMC geriatrics. 2006; 6:7. [PubMed: 16584565]
17. Paquay L, De Lepeleire J, Schoenmakers B, Ylieff M, Fontaine O, Buntinx F. Comparison of the diagnostic accuracy of the Cognitive Performance Scale (Minimum Data Set) and the Mini-Mental State Exam for the detection of cognitive impairment in nursing home residents. International journal of geriatric psychiatry. Apr; 2007 22(4):286–293. [PubMed: 17022109]
18. Hartmaier SL, Sloane PD, Guess HA, Koch GG, Mitchell CM, Phillips CD. Validation of the Minimum Data Set Cognitive Performance Scale: agreement with the Mini-Mental State Examination. The journals of gerontology. Series A, Biological sciences and medical sciences. Mar; 1995 50(2):M128–133.

19. Oresanya L, Zhao S, Gan S, et al. Functional outcomes after lower extremity revascularization in nursing home residents: a national cohort study. JAMA internal medicine. Jun; 2015 175(6):951–957. [PubMed: 25844523]

20. Finlayson E, Wang L, Landefeld CS, Dudley RA. Major abdominal surgery in nursing home residents: a national study. Annals of surgery. Dec; 2011 254(6):921–926. [PubMed: 22020197]

21. Neuman MD, Silber JH, Magaziner JS, Passarella MA, Mehta S, Werner RM. Survival and functional outcomes after hip fracture among nursing home residents. JAMA internal medicine. Aug 1; 2014 174(8):1273–1280. [PubMed: 25055155]

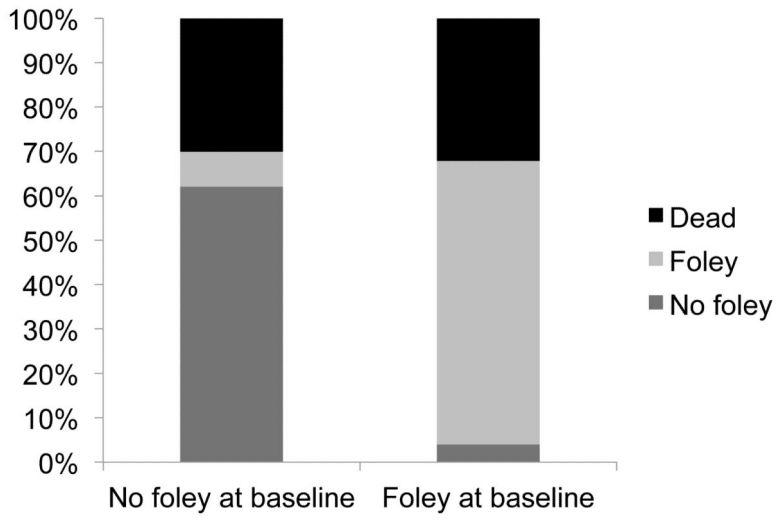

Figure 1.
Bar graph of presence of foley status at baseline and at 1 year s/p procedure

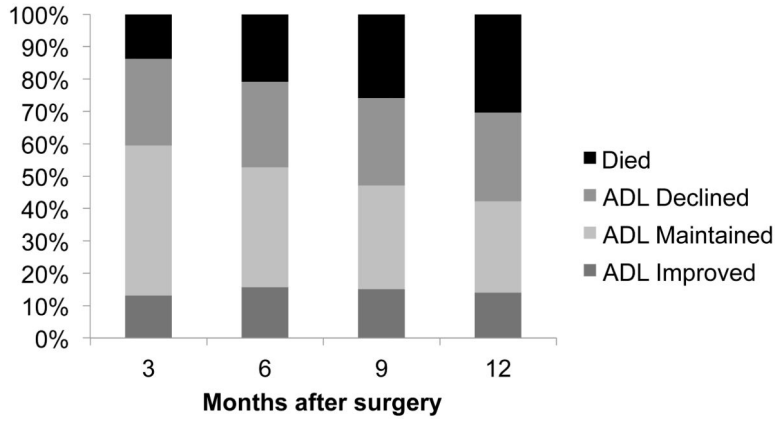

Figure 2.
ADL Status up to 1 year after surgery

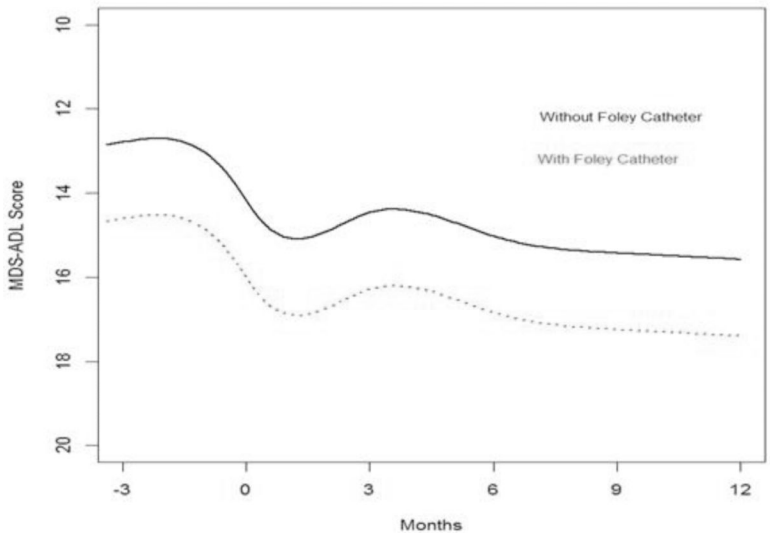

Figure 3.

Functional trajectory of men with and without a foley catheter up to 1 year after surgery ($p<0.0001$).

Table 1

Baseline characteristics of nursing home residents undergoing TURP/TULIP procedures.

Characteristic	All Subjects: (N= 2869)	Foley at baseline		
		No Foley: (N= 1691)	Foley: (N= 1178)	P value
Age, (mean, SD)	80.9 ± 7.0	81.0 ± 7.1	80.8 ± 6.9	0.3887
Age, N (%)				
65-69	177 (6.2)	103 (6.1)	74 (6.3)	0.9634
70-79	1007 (35.2)	591 (35.1)	416 (35.4)	
>=80	1676 (58.6)	990 (58.8)	686 (58.3)	
Race, N (%)				
White	2310 (80.5)	1303 (77.1)	1007 (85.5)	<0.0001
Black	411 (14.3)	288 (17.0)	123 (10.4)	
Other	148 (5.2)	100 (5.9)	48 (4.1)	
Baseline MDS-ADL summary score, (mean, SD)	13.8 ± 7.6	12.4 ± 7.7	15.8 ± 6.9	<0.0001
Baseline MDS-ADL summary score according to quartile, %*				
Q1: 0-10	951 (33.1)	687 (40.6)	264 (22.4)	<0.0001
Q2: 11-17	910 (31.7)	528 (31.2)	382 (32.4)	
Q3:18-21	560 (19.5)	265 (15.7)	295 (25.0)	
Q4: 22-28	448 (15.6)	211 (12.5)	237 (20.1)	
Baseline MDS-CPS summary score, (mean, SD)	2.1 ± 1.5	2.1 ± 1.5	2.1 ± 1.5	0.6957
MDS-CPS score: N (%)				
>=3	1270 (44.3)	749 (44.3)	521 (44.2)	0.9721
<3	1599 (55.7)	942 (55.7)	657 (55.8)	
Baseline MDS-CPS summary score according to presence of cognitive impairment: N (%)				
CPS=0	652 (22.7)	376 (22.2)	276 (23.4)	0.4083
CPS=1	388 (13.5)	236 (14.0)	152 (12.9)	
CPS=2	559 (19.5)	330 (19.5)	229 (19.4)	
CPS=3	848 (29.6)	516 (30.5)	332 (28.2)	
CPS=4	250 (8.7)	141 (8.3)	109 (9.3)	
CPS=5	172 (6.0)	92 (5.4)	80 (6.8)	
Functional decline before surgery, N (%)	821 (28.6)	389 (23.0)	432 (36.7)	<0.0001
Number of hospitalizations in year prior to surgery (mean, SD)	4.0 ± 3.3	3.4 ± 3.1	4.8 ± 3.5	<0.0001
Charlson score, %				
0--	936 (32.6)	595 (35.2)	341 (28.9)	0.0050
1--	681 (23.7)	380 (22.5)	301 (25.6)	
2--	485 (16.9)	281 (16.6)	204 (17.3)	

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Characteristic	All Subjects: (N= 2869)	Foley at baseline		
		No Foley: (N= 1691)	Foley: (N= 1178)	P value
>=3	767 (26.7)	435 (25.7)	332 (28.2)	

Table 2

Factors associated with TURP/TULIP failure defined as presence of a foley at 1-year status post procedure among 1 year survivors.

Variable Name	Observed (N)	Event #, (%)	RR & 95% CI	P value
Baseline H3D group:				
No foley at baseline	1548	650 (41.99)	Ref.	
Foley at baseline	1017	641 (63.03)	1.39 (1.29 - 1.50)	<0.0001
Age group:				
65-69	162	71 (43.83)	Ref.	
70-79	897	417 (46.49)	1.05 (0.88 - 1.27)	0.5696
>=80	1506	803 (53.32)	1.19 (1.00 - 1.42)	0.0524
Race:				
White	2055	1057 (51.44)	Ref.	
Black	379	168 (44.33)	0.89 (0.79 - 1.00)	0.0554
Others	131	66 (50.38)	0.99 (0.83 - 1.17)	0.8752
Baseline MDS-ADL decline:				
No	1819	849 (46.67)	Ref.	
Yes	746	442 (59.25)	1.10 (1.02 - 1.19)	0.0199
Baseline MDS-ADL summary score according to quartile:				
Q1: 0-10	859	342 (39.81)	Ref.	
Q2: 11-17	805	414 (51.43)	1.18 (1.06 - 1.31)	0.0022
Q3:18-21	502	289 (57.57)	1.23 (1.10 - 1.39)	0.0005
Q4: 22-28	399	246 (61.65)	1.34 (1.18 - 1.52)	<0.0001
MDS-CPS score:				
<3	1395	678 (48.60)	Ref.	
≥3	1170	613 (52.39)	1.00 (0.92 - 1.08)	0.9932
Number of hospitalizations in year prior to surgery:				
0--	372	140 (37.63)	Ref.	
1--2	697	342 (49.07)	1.26 (1.09 - 1.46)	0.0021
>=3	1496	809 (54.08)	1.23 (1.07 - 1.41)	0.0031
Charlson score, N (%)				
0--	853	403 (47.25)	Ref.	
1--	603	308 (51.08)	1.02 (0.92 - 1.13)	0.6443
2--	423	215 (50.83)	1.01 (0.90 - 1.14)	0.8436
>=3	686	365 (53.21)	1.05 (0.96 - 1.16)	0.2925